McDonalds eLearning Application

RESEARCH DOCUMENT

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Contents

1. Introduction

1.1. MCDONALD'S ELEARNING APPLICATION OVERVIEW

This research document contains the research required to create a McDonald's eLearning Application. The aim of this project is to create a mobile and web application that enables McDonald's employees to complete their onboarding and continuous training through gamified eLearning rather than paper form *Station Observation Checklists* (SOCs). The application would also provide additional functionality for Crew Trainers and Managers to oversee employees' training progress and results.

A number of different technologies must be assessed, tested, and understood to help identify which solution would best fit this project.

Research into other training methods in similar workplaces and other similar eLearning applications will also be carried out in order to identify what works well and how it can be applied to this project.

Front-end technologies will be examined to identify a suitable GUI for the end user, both on Android and iOS devices.

The goal of McDonald's eLearning is to remove the need for manual data entry and paper forms while also providing a better resource for employees thus improving their work performance.

2. Learning Strategies and Methods

2.1. DOES ELEARNING WORK?

A scientific research report was published in 2017 by Will Thalheimer investigating the benefits, if any, of eLearning versus your standard classroom scenario. Thalheimer concluded that when learning methods are held constant between eLearning and classroom instruction [1] the results do not differ. Thalheimer also went on to mention that if the methods are not held constant that eLearning tends to thrive in comparison to your standard classroom instruction.

Thalheimer came to the conclusion that with any type of learning the best practice is blended learning - using both eLearning and standard classroom instruction. This is due to eLearning generally using more effective learning methods in comparison to classroom instruction. Taking this into consideration for the McDonald's eLearning application, a certain amount of 'on the floor' training may still need to be carried out but may not need to be recorded. A significant part of SOCs is observation and by removing the need for paper forms and resorting to eLearning, Crew Trainers will have to be more attentive of Crew Members performance.

2.2. ELEARNING IN THE WORKPLACE

The government of New Zealand carried out a study on eLearning in the workplace in 2015. Peter Guiney [2], the author of this report, came to several interesting conclusions, one of which being that eLearning is more effective when people can access it in small 'chunks', reflect on it and then apply it immediately. Dividing larger learning tasks into smaller chunks entices the user to complete more tasks as they are not met with a 15 to 20-minute assignment but rather a 3 to 5 minute task which is more easily achievable.

Guiney also stated that providing eLearning to employees gives them a more flexible option for learning and allows them to upskill and improve more rapidly. Employees would have all the information needed at their fingertips rather than only during working hours or designated upskilling training sessions.

3. Similar Applications

3.1. DUOLINGO - THE WORLD'S BEST WAY TO LEARN A LANGUAGE

If you are not familiar with *Duolingo* [3] it is an online platform that provides both a mobile and web application that allows users to learn new languages. It mimics the structure of video games in order to engage its users by providing a level-up system, achievements, and leaderboards.

In 2012, a research study was carried out to measure the effectiveness of Duolingo. The study was carried out over eight weeks on a random representative sample from Duolingo users who studied Spanish. These participants resided in the United States, were not of Hispanic origin nor were they advanced users of Spanish and were all native English speakers. They took a college placement exam at the beginning and end of the study and the effectiveness of Duolingo was then measured by comparing the results from the initial and final results.

Overall, the results proved Duolingo's effectiveness. One interesting factor taken from the study was that participants with a lower initial level of knowledge gained the most in comparison to those with a higher initial level of knowledge gaining the least [4]. This is particularly interesting because the McDonald's eLearning Application will have a huge focus on onboarding learning for new employees. The study estimated that a person with no knowledge of Spanish would need on average 34 hours to cover the material for the first college semester of Spanish.

Also, taking from Duolingo's 'gaming' aspect, implementing achievements, a level-up system and store leaderboard may entice Crew Members to work hard during their eLearning. Creating a *gamified* experience would turn tedious, repetitive work into something more enjoyable.

4. Technologies

4.1. FRONT-END TECHNOLOGIES

4.1.1. Xamarin

Xamarin [5] is an open-source tool for developing cross-platform mobile applications for iOS, Android, and Windows with C#. It enables developers to share an average of 90% of their application across platforms. This allows developers to achieve the native performance, look and feel for each individual platform using only a single language.
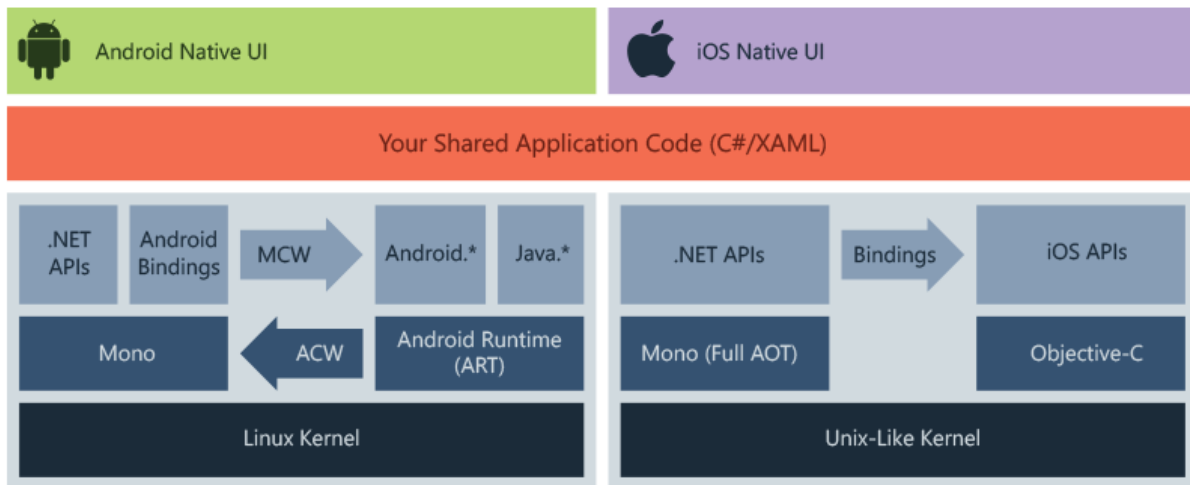

Figure 1: How Xamarin works [5]

Above is the overall architecture of a Xamarin application. The developer creates a native UI for each platform and writes the corresponding application logic in C# that is shared across platforms. Xamarin is built on top of Mono [6] which is an open-source version of the .NET Framework. The Mono execution environment automatically handles tasks such as memory allocation and garbage collection.

One concern I came across while reading an article [7] about the pros and cons of development in Xamarin is User Interface (UI) and graphics code shareability. There is no platform capable of being shared across multiple platforms. Of course, some elements will be reusable but not the entire UI. Therefore, some knowledge about UI design on different platforms is necessary. Due to this, Xamarin also is not a first choice for many mobile game developers and therefore some concern should be had about the limitations of gamifying this application.

4.1.2. Ionic

Ionic [8] Framework is an open-source toolkit for developing mobile and desktop applications using HTML, CSS, and JavaScript. Ionic focuses highly on the frontend User Experience (UX). It has official integrations with Angular [9] and React [10] as well as other

frameworks and libraries. Ionic produces a final product that can work as an iOS app, an Android app, a Progressive Web App (PWA) and a Desktop app.

Ionic works by taking the HTML, CSS and JavaScript of a web application and converting it to native code allowing the application to be available on mobile devices [11]. Ionic also has a very similar UI to Native Apps which leaves one less thing to worry about during implementation. Taking this into account, Ionic would be an ideal solution in comparison to Xamarin as the UI of the application is very important in order to keep users engaged.

4.1.3. Conclusion

In conclusion, I decided to go with Ionic as my front-end choice for this project. In theory, it provides a better framework for developing a cross platform web and mobile application whilst also being able to have a very appealing UI. I also decided to use Angular alongside Ionic as there were a lot of resources available in the official Ionic documentation [12] and a Udemy course [13] which helped me get started with the basics.

4.2. BACK-END TECHNOLOGIES

4.2.1. PHP

PHP [14] is a popular scripting language used mainly in web development. I decided to consider PHP because of my past knowledge working with it. PHP has been used in the development of many applications such as Facebook, Yahoo and Wikipedia.

PHP is mostly *synchronous* [15]. This means that the next line of code is executed *only* when the previous line has finished. Because of this, PHP is known for having an overall longer execution time.

4.2.2. Node.js

Node.js [16] is a JavaScript runtime environment that executes code outside of a browser. I decided to consider Node.js because of its reputation in the industry and the possible learning outcomes of working with a new technology in comparison to something I have worked with before. Node.js has been used in the development of many applications such as LinkedIn, Netflix, and PayPal.

Node.js is mostly *asynchronous* [15]. This means all the code is executed at the same time. Because of this, when compared to something like PHP, Node.js has a much faster execution time.

Node.js is highly recommended when developing real-time applications, such as chat apps or streaming services, due to its low latency and fast execution time. This is perfect for this project as the users will want real-time feedback when using the application.

4.2.3. Firebase

Firebase [17] is a mobile and web development platform. Firebase has a lot of different products such as authentication, hosting and real time database which made it the perfect platform for this application. The real time database is a cloud-hosted NoSQL database. It stores data as a JSON file.

I considered Firebase for this project as a lot of the resources I found for Ionic suggested it. Upon further research I learned that its free plan provided a lot of functionalities that would be useful throughout this project.

4.2.4. Conclusion

In conclusion, I decided to go with Node.js as the back-end technology for my project. It is a more widely respected technology in the industry and so the learning outcomes will be much more beneficial. In theory, it also runs a lot faster than PHP and much better for developing real-time applications. I also settled on Firebase as, like I said before, the resources I found for Ionic recommended it and I am confident it would be properly suited to this project.

5. APK vs Browser

After deciding to work with the Ionic Framework I had to differentiate what differences, if any, there would be between using the application as a Progressive Web App (PWA) on a phone's web browser and using the application as a mobile app (APK).

The Udemy course [13] I watched helped me understand how Ionic deploys mobile applications and from my understanding there is not much of a difference between using the PWA versus using the APK. Ionic uses Capacitor [18] to deploy mobile applications. Capacitor is a tool that allows you to take your PWA and wrap it into a web view that is accessed as a native mobile application. This gives the user a more convenient way to access the application rather than having to search for it through their phone's browser.

6. Feedback

13/11/2019 - Received feedback from a colleague discussing the need for a 'Practice SOC' feature. It was decided to remove this feature as users can just choose whether to submit their result or not at the end of the 'Take SOC' process.

17/01/2020 - Received feedback from Richard Butler during the project presentation about implementing a feature that pushes questions that the user struggles with.

23/03/2020 - Due to global pandemic ability to demo and receive feedback from McDonald's managers has ceased.

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8. Appendix

8.1 DECLARATION

- I declare that all material in this submission e.g. thesis/essay/project/assignment is entirely my own work except where duly acknowledged.
- I have cited the sources of all quotations, paraphrases, summaries of information, tables, diagrams, or other material; including software and other electronic media in which intellectual property rights may reside.
- I have provided a complete bibliography of all works and sources used in the preparation of this submission.
- I understand that failure to comply with the Institute's regulations governing plagiarism constitutes a serious offense.

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